This is a report on the World Protein Supply presented by Mr. Butler, Director of the APHIS Planning and Evaluation Staff, at the Administrator's Staff on June 27, 1973. The content has important implications for APHIS programs and should be circulated to staff members who may benefit.

April 16, 1973

PROTEIN REPORT

I'd like to start off this report by showing you a chart which has stuck in my memory ever since the first time I saw it and which *may* have a great deal of relevance to the current agricultural situation. I emphasize the use of the word "may" because I don't think anybody really knows. The lesson the chart seeks to illustrate is not that there are always limits to growth (it is common knowledge that in this world nothing grows without limit) but rather that whatever the limits may be, the speed with which they are finally reached always comes as a surprise.

While the chart is being shown on the screen, let me read a few paragraphs of interpretation from the accompanying text:

> *Ever since Malthus stated his propositions relating population and food some 150 years ago, the validity of his assumption that food imposes an ultimate limit on population has been debated. The continued growth of population and the rise in the productivity of agriculture are often cited to refute Malthus. But it is undeniable that Malthus stated one ultimate barrier to unending population expansion. His assertion is not erroneous; it is merely incomplete.*
>
> *Food supply may not be the first barrier to restrain rising population. Other forces within the world's socio-technological system may suppress further increase in population before starvation does.*
>
> *Population, capital investment, pollution, food consumption, and standard of living have been growing exponentially throughout recorded history. Man has come to expect growth, to see it as the natural condition of human behavior, and to equate growth with "progress." We speak of the annual percentage growth in gross national product (GNP) and in population. Quantities that grow by a fixed percentage per year are exhibiting "exponential" growth. But exponential growth cannot continue indefinitely.*
>
> *Pure exponential growth possesses the characteristic of behaving according to a "doubling time." Each fixed time interval shows a doubling of the relevant system variable. Exponential growth is treacherous and misleading. A system variable can continue through many doubling intervals without seeming to reach significant size. But then, in one or two more doubling periods, still following the same law of exponential growth, it suddenly seems to become overwhelming.*

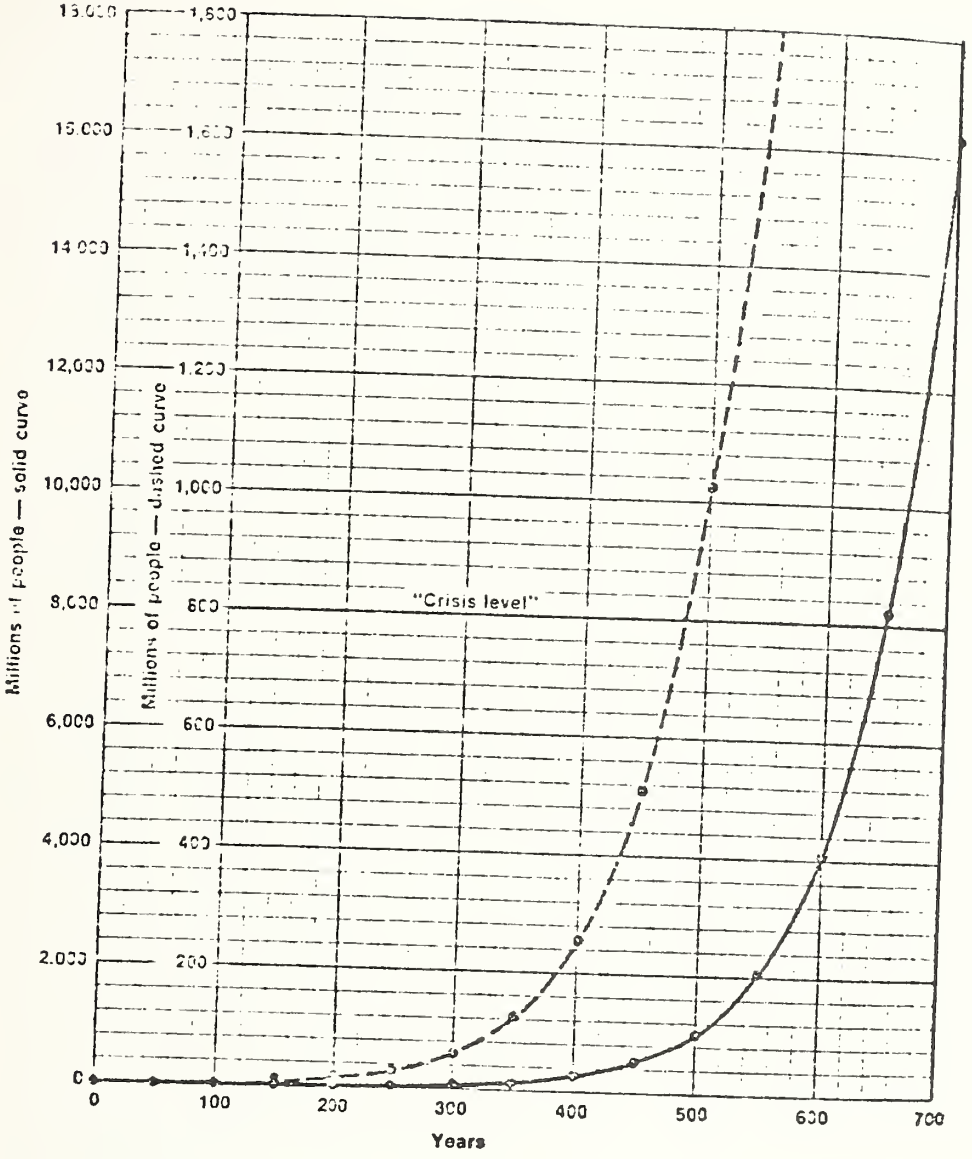

Figure 1-2 Population growth, plotted to scale, with a doubling time of 50 years.

The psychological impact of exponential growth is seldom appreciated. Suppose that some ultimate physical limit stands in the way of a quantity that is growing exponentially. In all previous time before the limit is approached, the quantity is much smaller than the limit. The very existence of the limit may be unrealized. No clash between the growing quantity and the limit forces attention to the eventual pressures that must arise. Then suddenly, within one doubling interval, the quantity grows from half the limit to the limit. The stresses from overexpansion become highly visible; they can no longer be ignored. If the . . . .

Exponential growth is only significant in comparison to some relevant limit. The power and nature of exponential growth are best appreciated through an example. Suppose, for purposes of illustration, that we start with a population of 1 million people and that number doubles every 50 years. In 700 years the population rises from 1 million to 16,384 million.

The values have been plotted as the solid line on the graph of Figure 1-2. A "crisis level" at 8,000 million people has been arbitrarily chosen as the point beyond which the pressures from conflict between growth and some limit become severe. In drawing a chart as in Figure 1-2, we tend to pick the vertical scale so that the point of concern lies about halfway up the page. It is this choice of scales which makes growth appear so steep and sudden, and not any change in the "law of growth" that has been governing the system. To illustrate that exponential growth seems to surge up toward any ultimate limit regardless of its value, suppose that the "crisis level" in Figure 1-2 were at 800 million people instead of 8,000 million. A second . . . and . . . are plotted . . . . A reduction of the "crisis level" by a factor of 10 has caused growth to impinge on that lower limit some 170 years sooner than for the solid curve. Otherwise the sudden rise and shape of the clash between growth and the limit are the same.

The surprise that we experience from exponential change comes, not from any sudden alteration in the pattern of growth, but instead from the pressures of governed growth. Population, which doubled 12 times in the preceding 600 years, only doubles twice more between the 600th and the 700th years. But in this one century it becomes apparent that 50-year doubling cannot continue as the rule controlling growth.

Within one lifetime, dormant forces within the world system can exert themselves and take control. Falling food supply, rising pollution, and decreasing space per person are on the verge of combining to generate pressures great enough to reduce birth rate and increase death rate. When ultimate limits are approached, negative forces in the system gather strength until they stop the growth processes that had previously been in control. In one brief moment of time the world finds that the apparent law of exponential growth fails as the complete description of nature. Other fundamental laws of nature and the social system have been lying in wait until their time has come. Forces within the world system must and will rise far enough to suppress the power of growth.

The foregoing was from World Dynamics by Jay W. Forrester.

Are we within a lifetime of reaching the limit of the food supply? Some of the recent editorial writing would have us believe as much. The tendency to extrapolate the current situation far into the future is well-nigh universal. The Washington Post believes that we can say goodbye to cheap food forever, that fundamental changes have taken place which will guarantee higher real prices as far into the future as their editorial writers can see. This view is not unlike that of the mutual fund managers and financial advisory services who project a permanent shortage of computers, hamburger stands and cosmetic items for door-to-door sales.

But there is another view. Listen to this:

When they asked the great speculator, Jesse Livermore, for his stock market philosophy, his classic response was "buy low, sell high." More the investor, Bernard Baruch allegedly paraphrased this trading jingle with an economic catechism, "buy surplus, sell scarcity."

Of course, both phrases are simplistic aphorisms; however, the idea of selling "scarcity" has sound basis in one of the most fundamental concepts of economics: the law of supply and demand. Basically the law of supply and demand says that when demand for a commodity grows faster than its sources of supply, the price will rise because the product is scarce. Rising prices, in turn, will spur new sources of supply. Result: over-supply and/or slackening of demand. Then the cycle turns: scarcity becomes surplus, prices decline and so does profitability. Soon the cost of carrying the new production capacity becomes an additional burden, while price-cutting grows more vicious. Eventually, the

low level of prices and profitability compels the shutdown of the least efficient capacity and the commodity is ready to start the cycle all over again. Nevertheless, many institutional investors, obsessed with being in the "now stocks," delude themselves that shortages will persist; that basically cyclical companies thus are transformed into "growth stocks"; and that buying "scarcity," even at historically inflated price-earnings multiples, is sound long-term investing. It is not. Remember silver (the best shortage story I ever heard), sulphur (the world would be short sulphur forever), uranium (the price had to go up) and synthetic fibers (the technology was too complex). Those with longer memories might recall aluminum, coal and cement.

Down on the Farm

In this context, it seems to me Wall Street's current infatuation with agriculture is short-sighted. We went through a similar enthusiasm in the mid-'Sixties, when "feed the world" was the cry. However, a new blight-resistant breed of rice was developed; all of a sudden India was self-sufficient in food and the stock market "plays on hunger" collapsed.

This time around, the assumption seems to be that U.S. agriculture is in a new era of "permanent prosperity" because Russia and China for the foreseeable future will be buyers of foodstuffs, as they were last year and will be this year. Thus, the reasoning goes, the farm equipment, seed and fertilizer stocks are buys as "growth" companies.

The facts are that Russia has been steadily expanding its grain production; between 1964 and 1970, in every year but one, it was a small net exporter of grain. Furthermore, self-sufficiency in food production is right at the top of the Soviet priority poll. However, 1972 proved a disastrous year for Russian agriculture. First its planners made a serious error in emphasizing corn, which they now have learned is not a crop suited for the relatively dry Russian climate. Moreover, an extremely cold winter yielded a severe winter-kill of grain, and was followed by the hottest and driest summer in 50 years. The grain harvest for the year was apparently almost 15% below plan. So, the USSR was forced to buy from the U.S.

Much the same is true of China, which also was in the wheat market in 1972. There was a drought in north and central China last year, but over the past decade, China has been increasing its grain production at 1.9% annually or about as fast as its population

growth. Here, too, the government is adamantly committed to self-sufficiency in agriculture, not least because it doesn't have the ability to earn hard currencies through trade to pay for food imports.

The Cycle Remains

Thus it seems naive to believe that either Russia or China will be major buyers of U.S. grain except when natural disasters or planning failures disrupt their production. With this perspective, while 1972 and 1973 stack up as bumper years for foreign buying of U.S. farm output, they do not signal the end of the traditional pattern of wide swings in demand and prices for agricultural products, seed, fertilizer and farm equipment.

Moreover, the U.S. government is attempting to encourage American farmers to boost acreage under cultivation and is taking advantage of the present prosperity to eliminate all direct payment subsidies for the farmer. The goal is to reduce food prices, but it also has the result of shifting the market risk to the farmer when global demand diminishes.

These excerpts were taken from an article in Barron's by Barton Biggs.

With these fascinating observations as a backdrop, let me proceed with a discussion of the current protein and meat situation.

For the maintenance of good nutrition, USDA recommends a schedule of daily protein intake, by age group, which weights out to an average of 53 grams per person. Protein available for consumption per capita from the food supply, at the retail level, averages about 100 grams per day. This latter figure fluctuates within a range of 95 and 100 grams. Thus, we have nearly twice as much protein in our food supply as we need. This ratio would shrink somewhat if the quality of that protein were taken into account, but there would still be a substantial excess of intake over requirements.

The percentage of this protein supplied by major food groups is shown in the next table. Note the massive shift over the years away from cereal products to the more expensive meat and poultry items.

The protein content of these major sources varies widely as the next figure shows.

With rising incomes, consumers' food buying patterns change. There is a shift away from what are referred to as inferior foods toward the items with higher status, such as beef.

Percentage of Protein Supplied, by Major Food Groups

Year	Meat	Poultry	Fish	Eggs	Dairy	Dry Beans Peas, Nuts	Flour and Cereal Prods.	All Other
1909-13	23.8	3.3	2.9	5.2	16.4	4.5	35.8	8.1
1925-29	22.9	3.4	3.1	6.1	19.0	4.8	31.8	8.9
1935-39	22.7	3.4	3.1	5.8	21.1	5.7	28.7	9.5
1947-49	25.3	4.5	2.9	7.1	23.6	5.0	22.9	8.7
1957-59	26.8	5.8	3.0	6.8	24.5	5.2	19.9	8.0
1967-69	29.4	7.6	3.5	5.9	22.6	5.0	18.3	7.7
1970	29.9	8.1	3.6	5.8	22.4	4.7	17.9	7.6

Protein Content of the Edible Portion of Selected Food Items

	Percent		% Protein Bone Dry Basis
	Water	Protein	
Beef, cooked			
Pot-roasted, lean only	62	30.6	80.5
Hamburger, regular, cooked	54	24.7	53.7
Steak, broiled, lean and fat	55	28.2	62.6
Chicken, breast, fried, with bone	58	26.6	63.3
Chicken, drumstick, fried, with bone	55	20.3	45.1
Ham, roasted	54	21.2	46.1
Pork chop, lean and fat, cooked	42	24.2	41.7
Haddock, breaded, fried	66	20.0	58.8
Cheese, cheddar	37	25.0	39.7
Milk, whole	87	3.7	28.5
Eggs, hard-boiled	74	12.0	46.1
Dry beans, cooked and drained	69	7.8	25.2
Bread, white	36	8.6	13.4
Flour, all purpose	12	10.4	11.8
Oatmeal, cooked	87	2.1	16.2

Table 6.--All food: Per capita consumption,

Year	Meat, poultry, fish				Eggs	Dairy products		Fats and oils				Fruits			Melons 5/
									Including butter 4/						
	Meat 2/	Poultry	Fish 3/	Total		Including butter	Excluding butter	Excluding butter	Animal	Vegetable	Total	Fresh	Processed	Total	
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1909	147.7	17.2	(13.0)	177.9	35.5	378	360	(23.2)	(31.3)	(9.7)	(41.0)	123.3	7.2	130.5	40.0
1910	139.0	18.0	(13.2)	170.2	37.1	355	337	(23.6)	(31.8)	(10.1)	(41.9)	123.0	7.6	130.6	39.0
1911	144.6	18.1	(13.3)	176.0	39.9	344	325	(22.7)	(31.7)	(9.6)	(41.3)	139.1	8.4	147.5	38.0
1912	139.1	17.4	(13.3)	169.8	37.7	386	369	(22.2)	29.2	(9.6)	(38.8)	142.4	9.2	151.6	39.0
1913	136.8	16.9	(13.5)	167.2	36.8	376	360	(23.7)	27.4	(12.8)	(40.2)	118.9	8.2	127.1	38.0
1914	133.0	16.9	(13.7)	163.6	35.8	359	342	(26.5)	29.4	(14.1)	(43.5)	146.3	9.9	156.2	35.0
1915	129.5	16.8	(13.2)	159.5	37.9	357	340	(26.0)	29.1	(14.1)	(43.2)	140.7	11.2	151.9	36.0
1916	134.5	16.2	(13.0)	163.7	36.3	354	337	(24.9)	30.7	(11.5)	(42.2)	122.1	12.6	134.7	36.0
1917	129.3	15.6	(12.9)	157.8	34.1	363	347	(24.4)	28.1	(12.0)	(40.1)	118.5	14.3	132.8	35.0
1918	134.9	15.6	(12.9)	163.4	34.4	390	375	(29.3)	28.3	(15.1)	(43.4)	109.1	12.4	121.5	37.0
1919	133.7	16.6	(13.6)	163.9	36.8	369	354	(28.1)	28.1	(15.2)	(43.3)	111.9	16.9	128.8	36.4
1920	130.5	16.0	(13.8)	160.3	36.3	378	363	(24.8)	28.4	(11.3)	(39.7)	130.3	16.7	147.0	42.5
1921	128.3	15.7	(12.5)	156.5	36.4	378	362	23.2	28.5	11.0	39.5	103.7	14.0	117.7	45.2
1922	131.8	16.5	(13.3)	161.6	38.3	377	360	26.0	32.2	10.9	43.1	132.2	14.3	146.5	46.2
1923	141.4	16.8	(12.7)	170.9	39.6	366	348	26.9	34.0	10.7	44.7	132.3	14.8	147.1	38.1
1924	141.0	15.9	(13.0)	169.9	39.2	376	358	27.7	33.8	11.7	45.5	135.6	15.4	151.0	42.9
1925	133.8	16.4	(13.1)	163.3	38.6	377	359	28.7	32.2	14.6	46.8	121.2	17.8	139.0	41.8
1926	131.1	16.3	(13.4)	160.8	41.0	377	359	29.4	32.4	15.3	47.7	147.1	18.4	165.5	43.5
1927	128.7	17.4	(14.2)	160.3	41.5	376	358	29.6	32.7	15.2	47.9	116.0	19.5	135.5	38.6
1928	126.1	16.7	(14.1)	156.9	41.0	376	358	30.1	32.4	15.3	47.7	133.7	19.4	153.1	38.4
1929	125.3	16.4	13.9	155.6	40.5	381	363	31.1	32.0	16.7	48.7	128.1	18.5	146.6	40.7
1930	123.3	17.9	12.2	153.4	40.2	378	360	31.2	31.7	17.1	48.8	119.3	19.1	138.4	41.5
1931	125.2	16.2	10.8	152.2	40.4	376	358	30.0	33.5	14.8	48.3	147.0	16.4	163.4	41.3
1932	125.8	16.6	10.4	152.8	38.0	379	360	28.3	33.9	12.9	46.8	115.9	16.6	132.5	36.4
1933	130.0	17.3	10.7	158.0	36.0	377	359	28.7	33.3	13.6	46.9	114.8	18.0	132.8	35.8
1934	135.7	15.9	11.2	162.8	35.0	368	349	29.9	33.1	15.4	48.5	115.0	18.6	133.6	36.1
1935	110.9	15.4	12.5	138.8	34.0	372	354	30.5	29.1	19.0	48.1	134.2	21.8	156.0	37.5
1936	122.6	16.4	13.7	152.7	35.0	374	357	32.7	30.2	19.3	49.5	124.1	25.2	149.3	36.8
1937	119.7	16.4	13.8	149.9	37.3	377	360	32.5	28.9	20.4	49.3	142.7	24.3	167.0	38.9
1938	120.3	15.5	12.8	148.6	37.6	376	359	32.5	29.4	19.7	49.1	131.0	26.5	157.5	37.5
1939	126.8	17.1	12.7	156.6	37.9	381	364	32.9	31.7	18.6	50.3	148.6	29.5	178.1	35.9
1940	135.9	17.5	13.0	166.4	38.7	382	365	33.2	33.0	17.2	50.2	138.4	33.6	172.0	36.8
1941	137.0	18.8	13.2	169.0	37.7	385	369	35.1	32.0	19.2	51.2	146.8	31.9	178.7	34.1
1942	135.1	21.1	10.7	166.9	38.1	409	393	32.6	31.3	17.2	48.5	129.3	31.5	160.8	31.4
1943	143.3	26.1	9.9	179.3	41.6	427	415	33.2	26.7	18.3	45.0	116.0	27.0	143.0	30.8
1944	150.9	23.5	10.7	185.1	42.5	436	424	32.0	25.8	18.1	43.9	138.2	27.8	166.0	36.2
1945	140.9	25.5	11.9	178.3	48.4	451	440	31.1	24.0	18.0	42.0	133.4	33.7	167.1	37.7
1946	147.8	23.5	12.8	184.1	45.5	447	436	32.3	23.3	19.5	42.8	131.6	47.8	179.4	38.4
1947	147.4	22.1	12.3	181.3	46.8	424	413	33.9	25.7	19.4	45.1	139.6	40.8	180.4	35.1
1948	138.4	21.8	13.1	173.3	47.8	407	397	35.7	24.4	21.3	45.7	127.9	42.9	170.8	34.5
1949	137.6	23.3	12.9	173.8	47.4	406	396	35.2	24.1	21.6	45.7	121.0	42.1	163.1	33.2
1950	137.8	25.1	13.8	176.7	48.5	406	395	38.4	25.1	24.0	49.1	107.0	43.4	150.4	30.4
1951	132.4	26.5	13.2	172.1	49.3	408	398	35.6	24.1	21.1	45.2	115.6	42.6	158.2	31.6
1952	139.4	27.2	13.3	179.9	49.2	410	401	38.7	23.0	24.3	47.3	109.9	45.4	155.3	30.2
1953	146.4	27.1	13.6	187.1	47.8	406	398	38.7	22.6	24.6	47.2	104.8	45.2	150.0	32.5
1954	144.9	28.5	13.5	186.9	47.4	403	394	39.9	21.5	27.3	48.8	101.0	45.7	146.7	32.3
1955	152.2	26.7	12.9	191.8	46.9	407	398	40.2	22.7	26.5	49.2	95.2	48.8	144.0	33.0
1956	154.9	30.0	12.9	197.8	46.6	409	400	39.8	23.1	25.4	48.5	95.1	49.2	144.3	30.1
1957	146.7	31.8	12.8	191.3	45.9	403	395	39.3	21.8	25.8	47.6	93.0	50.8	143.8	27.6
1958	139.6	34.4	13.3	187.3	44.9	398	390	40.4	21.7	27.0	48.7	90.3	50.0	140.3	29.5
1959	146.6	35.6	13.7	195.9	44.7	393	385	41.7	21.5	28.1	49.6	92.0	48.4	140.4	26.9
1960	146.7	34.5	13.2	194.4	42.5	384	377	41.0	20.1	28.4	48.5	89.4	50.2	139.6	28.2
1961	145.4	37.8	13.7	196.9	41.6	377	370	41.0	20.8	27.6	48.4	85.4	49.0	134.4	27.4
1962	147.1	37.3	13.6	198.0	41.4	376	369	41.6	20.1	28.8	48.9	80.8	49.6	130.4	25.0
1963	151.7	37.9	13.7	203.3	40.3	374	367	42.6	19.0	30.5	49.5	71.9	48.2	120.1	26.3
1964	155.6	38.7	13.5	207.8	40.4	374	367	43.9	18.5	32.2	50.7	76.8	46.4	123.2	24.8
1965	148.0	41.2	13.9	203.1	39.8	372	366	44.3	18.5	32.2	50.7	79.7	47.8	127.5	25.4
1966 11/	151.0	44.2	13.6	208.8	39.8	373	367	46.1	17.1	34.7	51.8	79.7	49.4	129.1	23.6

1/ Retail weight data are taken from tables 8-31. They comprise the quantity data used in computing the per capita food consumption index, table 1. Final consumer products that are derived from a combination of primary food groups, such as bakery products, are measured and reported in the form of their primary ingredients, such as flour, shortening, and eggs. Civilian consumption only, beginning 1941. Data in parentheses are approximations. 2/ Includes game and edible offal. 3/ Includes 2.0 pounds per capita of game fish 1909-51, increasing 0.1 pound annually to 3.0 pounds in 1961. 4/ Includes product weight of butter and margarine; other items in terms of fat content.

retail weight equivalent, 1909-66 1/

Fruits, melons, baby food	Vegetables: Fresh 2/	Vegetables: Processed: Canned	Vegetables: Processed: Frozen	Vegetables: Processed: Total	Vegetables: Total 3/	Vege-tables, soup, baby food 6/	Potatoes and sweet-potatoes 2/	Beans, peas, nuts, soya products 2/ 7/	Flour and cereal products 8/	Sugars and other sweet-eners 9/	Coffee, tea, cocoa	All foods 10/: Animal prod-ucts	All foods 10/: Crop prod-ucts	All foods 10/: Total	Year
Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	
170.5	(189)	15.3	---	15.3	(204.3)	204.5	211.9	16.6	300	85.6	9.8	605	1,009	1,614	09
169.6	(185)	14.5	---	14.5	(202.5)	202.9	221.1	16.3	295	87.9	9.6	576	1,013	1,589	10
165.5	(184)	15.6	---	15.6	(199.6)	200.1	181.0	16.0	291	90.2	9.1	573	983	1,556	11
170.6	(187)	18.7	---	18.7	(205.7)	206.4	201.5	16.4	286	88.6	11.3	606	1,011	1,617	12
165.1	(180)	19.8	---	19.8	(199.8)	200.7	209.4	16.0	283	93.0	9.7	591	991	1,582	13
191.2	(184)	19.2	---	19.2	(203.2)	204.3	178.3	15.2	280	92.3	9.9	571	986	1,557	14
187.9	(181)	18.0	---	18.0	(199.0)	200.1	206.0	15.0	278	88.9	11.3	567	1,002	1,569	15
170.7	(182)	16.1	---	16.1	(198.1)	199.2	166.3	14.3	277	88.6	12.4	568	941	1,509	16
168.8	(182)	18.9	---	18.9	(200.9)	202.2	171.3	18.2	268	90.0	14.1	567	945	1,512	17
158.5	(185)	22.3	---	22.3	(207.3)	208.6	196.3	16.6	260	90.9	12.0	602	959	1,561	18
165.2	180.5	21.3	---	21.3	201.8	203.1	177.9	16.3	259	105.9	13.1	583	956	1,539	19
189.5	195.9	18.2	---	18.2	214.1	215.5	165.8	14.4	242	102.3	12.7	588	954	1,542	20
162.9	185.3	16.6	---	16.6	201.9	203.4	178.9	13.8	229	101.2	12.8	583	914	1,497	21
192.7	190.2	16.8	---	16.8	207.0	209.2	167.3	13.8	242	119.8	13.0	592	970	1,562	22
185.2	183.9	21.2	---	21.2	205.1	208.0	192.4	15.4	241	106.1	14.1	592	974	1,566	23
193.9	189.9	22.7	---	22.7	212.6	215.0	166.6	16.5	239	116.1	13.4	601	973	1,574	24
180.8	190.2	25.4	---	25.4	215.6	217.4	169.5	16.1	235	118.8	12.3	593	965	1,558	25
209.0	190.0	25.7	---	25.7	215.7	217.7	145.3	16.3	238	120.0	14.1	593	977	1,570	26
174.1	189.4	22.1	---	22.1	211.5	213.7	159.7	17.7	239	119.2	13.5	593	953	1,546	27
191.5	188.0	22.8	---	22.8	210.8	213.3	161.6	17.6	239	121.1	13.0	588	973	1,561	28
187.3	194.0	25.7	---	25.7	219.7	222.6	174.2	16.8	236	113.9	14.1	591	982	1,573	29
179.9	196.7	28.3	---	28.3	225.0	227.2	145.4	17.6	228	125.7	13.6	585	955	1,540	30
204.7	192.6	25.2	---	25.2	217.8	219.5	151.1	18.3	226	115.3	14.3	584	965	1,549	31
168.9	198.0	22.0	---	22.0	220.0	221.6	156.3	16.4	223	110.0	13.8	585	924	1,509	32
168.6	194.5	21.9	---	21.9	216.4	217.9	151.3	15.9	213	110.9	14.4	586	907	1,493	33
169.7	200.2	23.2	---	23.2	223.4	225.8	154.6	17.7	204	110.2	13.6	580	912	1,492	34
193.5	198.2	26.1	---	26.1	224.3	226.9	161.9	18.1	204	110.6	15.7	556	951	1,507	35
186.1	198.1	27.6	---	27.6	225.7	228.9	145.6	19.1	208	111.5	16.1	575	936	1,511	36
206.0	196.8	29.3	0.4	29.7	226.5	230.4	143.4	18.0	203	109.1	15.0	576	946	1,522	37
195.1	198.9	31.0	.4	31.4	230.3	234.5	146.0	19.5	204	107.9	16.0	575	944	1,519	38
214.1	198.3	31.7	.5	32.2	230.5	235.4	138.1	19.7	201	113.3	16.9	590	958	1,548	39
208.9	197.9	34.2	.6	34.8	232.7	238.0	136.1	19.5	199	108.1	17.4	603	945	1,545	40
212.9	192.0	36.6	.7	37.3	229.3	234.6	142.7	19.2	199	117.9	18.0	608	965	1,573	41
192.6	199.5	39.5	1.1	40.6	240.1	245.7	142.3	22.5	201	102.8	15.1	629	940	1,569	42
174.2	204.4	36.7	.7	37.4	241.8	246.0	142.4	20.5	208	100.5	13.8	663	924	1,587	43
202.8	211.8	34.1	1.6	35.7	247.5	252.7	152.4	20.1	190	108.8	16.3	677	962	1,639	44
205.7	217.5	42.9	1.9	44.8	262.3	267.9	136.3	20.4	201	93.2	16.9	691	960	1,651	45
218.8	201.3	46.0	2.0	48.0	249.3	255.4	136.9	19.2	192	93.6	20.8	689	957	1,646	46
216.5	190.0	39.8	2.5	42.3	232.3	238.4	135.5	16.4	173	113.7	18.6	667	932	1,599	47
206.6	186.8	37.4	2.9	40.3	227.1	233.8	113.8	17.4	170	106.4	19.1	642	889	1,531	48
197.5	174.9	38.3	2.9	41.2	216.1	222.7	118.8	16.7	169	108.5	19.5	641	875	1,516	49
182.1	170.3	41.2	3.2	44.4	214.7	221.7	114.2	19.3	167	113.1	17.6	645	860	1,505	50
191.1	165.1	41.5	4.0	45.5	210.6	217.7	117.2	17.2	165	106.3	17.3	644	854	1,498	51
186.9	161.8	40.8	4.9	45.7	207.5	215.2	105.9	17.2	162	108.4	17.3	653	838	1,491	52
184.0	157.7	42.2	5.1	47.3	205.0	213.0	112.1	16.2	158	108.1	17.3	656	834	1,490	53
180.5	155.4	41.1	5.4	46.5	201.9	210.1	111.6	16.4	155	106.0	14.7	650	823	1,473	54
178.4	154.7	42.2	5.9	48.1	202.8	211.2	113.7	16.2	152	106.3	15.0	659	820	1,479	55
175.8	154.4	42.7	6.0	48.7	203.1	211.7	107.2	16.9	150	107.6	15.5	668	811	1,479	56
173.1	152.9	42.9	6.2	49.1	202.0	211.0	112.6	16.5	148	104.3	15.3	654	808	1,462	57
171.6	149.3	43.5	6.6	50.1	199.4	208.8	107.4	16.3	150	107.4	14.7	644	804	1,448	58
169.2	146.7	43.6	6.8	50.4	197.1	206.9	110.0	16.9	147	107.7	15.2	647	802	1,449	59
169.9	150.1	43.4	7.0	50.4	200.5	210.6	109.4	16.5	147	108.8	15.1	634	807	1,441	60
164.0	146.8	43.5	7.1	50.6	197.4	207.8	109.9	16.8	147	109.1	15.4	629	799	1,428	61
157.6	143.4	45.1	7.7	52.8	196.2	206.7	107.1	16.9	146	109.9	15.4	629	789	1,418	62
148.7	143.4	45.9	7.4	53.3	196.7	207.3	110.1	16.9	143	110.4	15.6	630	784	1,414	63
150.3	140.8	45.5	8.0	53.5	194.3	204.9	106.0	17.2	144	111.5	15.4	634	783	1,417	64
155.2	140.6	46.8	8.5	55.3	195.9	206.5	104.5	16.6	144	111.4	15.0	627	787	1,414	65
155.0	140.7	47.0	9.2	56.2	196.9	207.5	107.5	15.8	141	112.7	15.0	633	791	1,424	66

2/ Data for melons, fresh vegetables, potatoes, sweetpotatoes, and dry beans and peas include consumption of home garden produce, table 25. 6/ Excludes estimated quantities of meat, poultry, and fish base soups duplicated elsewhere. 7/ Since 1953 approximations for soya products are continued at 1.3 pounds. 8/ Corn sugar and sirups are with sugars and other sweeteners. 9/ Excludes sugar used in production of canned and frozen fruit, canned fruit juices, canned vegetables, and unskimmed sweetened condensed milk. 10/ Includes spices and herbs from table 31 (with approximations prior to 1910). 11/ Preliminary.

Since 1960, beef consumption per capita has risen commensurately, with real per capita disposable income: both increased nearly 40 percent. Pork consumption rose about 12 percent over the same period. Increases of these magnitudes are greater than most analysts would have expected, and indicate a significant shift in favor of these high priced products. ERS economists are projecting a further increase of nearly 20 percent in per capita beef consumption over the next 12 years. But pork consumption is not expected to be much different in 1985 than it is currently.

Per capita consumption of poultry meat has risen at an even faster rate than beef consumption. Consumption of chicken and turkey is projected to increase at a slower rate, reaching 62 pounds by 1985. Last year it was 52 pounds.

Given the limits to the desire for food, when the consumption of one item goes up, the intake of something else comes down. Total food available for consumption on a retail weight basis averages out to around 1,450 pounds per capita. In recent years the big loser in the shifting patterns of consumption has been dairy products.

(Show table on page 15 of 1971 supplement)

But since the period just before World War I, there have been huge declines in the consumption of potatoes and sweet potatoes, flour and cereal products and fresh fruit.

While the protein content of 1985's projected national diet was not calculated, it is safe to say that the margin of intake over recommended allowances implied in the projection results is even greater than it is today.

To meet the increases in consumption of beef and other livestock products we will need to produce substantially more cattle and calves, chickens, turkeys and hogs, as shown on this table.

(Show Table 2. of Possible Directions for
Farm Production, Prices and Incomes)

These projections I have been talking about were prepared for the Annual Outlook Conference last February. It is interesting that the summary accompanying the table does not mention the possibility that we might become net exporters of meat, in fact, it assumes we will continue to be importers of beef. However, real incomes are rising fast in Japan and in Europe and we may expect the demand for meat to rise as a consequence.

Table 6.--All food: Per capita consumption, retail weight equivalent, 1960-71 1/

Year	Meat, poultry, fish				Eggs	Dairy products		Fats and oils			
	Meat 2/	Poultry	Fish 3/	Total		Including butter 4/	Excluding butter 4/	Excluding butter	Including butter 4/ Animal	Including butter 4/ Vegetable	Including butter 4/ Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1960	146.7	34.6	13.2	194.7	42.5	384	376	41.1	20.1	28.5	48.6
1961	145.4	37.8	13.7	196.9	41.6	377	370	41.0	20.8	27.6	48.4
1962	147.1	37.4	13.6	198.1	41.4	376	368	41.7	20.1	28.9	49.0
1963	152.0	37.9	13.7	203.6	40.4	374	368	42.6	19.6	29.9	49.5
1964	155.7	38.9	13.5	208.1	40.4	374	367	43.9	18.7	32.1	50.8
1965	148.3	41.3	13.9	203.5	39.9	373	366	44.5	18.4	32.5	50.9
1966	151.4	44.3	13.9	209.6	39.9	371	365	47.2	17.0	35.9	52.9
1967	157.7	46.2	13.6	218.1	41.1	362	357	47.0	17.3	35.2	52.5
1968	162.4	45.8	14.0	222.2	40.7	364	358	48.7	17.8	36.6	54.4
1969	161.4	47.8	14.2	223.4	40.3	360	355	49.8	16.0	39.2	55.2
1970	164.6	50.0	14.8	229.4	40.5	354	349	51.2	15.2	41.3	56.5
1971 5/	170.1	50.5	14.2	234.8	40.8	352	347	50.3	14.5	40.8	55.3

Year	Fruits			Melons 6/	Fruits, melons, baby food d/	Vegetables				
	Fresh a/	Processed b/	Total c/			Fresh 6/	Processed Canned	Processed Frozen	Processed Total	Total 6/
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1960	89.6	50.3	139.9	28.2	170.2	150.2	43.4	7.0	50.4	200.6
1961	85.8	49.0	134.8	27.4	164.4	146.9	43.5	6.9	50.4	197.3
1962	81.0	49.7	130.8	24.9	157.9	143.7	45.2	7.4	52.6	196.3
1963	72.2	48.2	120.3	26.2	149.0	143.7	46.1	7.2	53.3	197.0
1964	77.1	46.5	123.6	24.8	150.7	141.1	45.8	7.6	53.4	194.5
1965	79.9	48.1	128.0	25.4	155.7	141.1	46.9	8.0	54.9	196.0
1966	79.7	49.4	129.1	23.9	155.3	138.5	47.4	8.8	56.2	194.7
1967	80.3	52.0	132.3	24.3	158.9	140.6	48.9	9.0	57.9	198.5
1968	77.3	50.9	128.2	24.3	154.8	141.2	50.5	9.6	60.3	201.3
1969	78.0	55.4	133.4	25.0	160.7	141.4	51.3	9.1	60.4	201.8
1970	80.0	54.9	134.9	25.2	162.4	141.1	50.9	9.6	60.5	202.0
1971 5/	79.3	55.7	135.0	23.7	161.0	139.9	51.3	9.1	60.4	200.3

Year	Vegetables, soup, baby food 7/	Potatoes and sweet-potatoes 6/	Beans, peas, nuts, soya products 6/ 8/	Flour and cereal products 9/	Sugars and other sweeteners 10/	Coffee, tea, cocoa	All foods 11/ Animal products	All foods 11/ Crop products e/	All foods 11/ Total f/
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1960	210.8	109.4	16.5	147	108.8	15.1	633	807	1,440
1961	207.7	109.9	16.8	147	109.2	15.4	629	799	1,428
1962	206.8	107.1	16.9	146	110.0	15.4	628	790	1,418
1963	207.6	110.2	17.0	144	110.5	15.6	632	785	1,417
1964	205.1	106.8	17.1	144	111.6	15.4	634	784	1,418
1965	206.6	104.3	16.6	144	111.7	15.1	628	788	1,416
1966	205.3	108.3	15.6	143	113.0	15.1	632	793	1,425
1967	209.1	104.8	16.4	144	112.6	15.2	634	798	1,432
1968	211.9	107.5	16.1	144	116.2	15.3	639	804	1,443
1969	212.4	107.5	16.3	145	116.9	14.5	635	814	1,449
1970	212.8	106.5	15.7	141	113.8	14.3	634	815	1,449
1971 5/	210.9	106.3	15.8	142	119.7	14.1	637	812	1,449

1/ Retail weight data are taken from tables 8-31. Final consumer products from a combination of primary food groups, such as bakery products, are measured and reported in the form of their primary ingredients, such as flour, shortening, and eggs. Civilian consumption only. 2/ Includes game and edible offal. 3/ Includes 2.9 pounds per capita of game fish in 1960; 3.0 pounds thereafter. 4/ Includes product weight of butter and margarine, other items in terms of fat content. 5/ Preliminary. 6/ Includes consumption of home garden produce, table 25. 7/ Excludes estimated quantities of meat, poultry, and fish base soups duplicated elsewhere. 8/ Soya products approximated at 1.3 pounds. 9/ Corn sugar and sirups are with sugars and other sweeteners. 10/ Excludes sugar used in production of canned and frozen fruit, canned fruit juices, canned vegetables, and unskimmed sweetened condensed milk. 11/ Includes spices and herbs from table 31.

a/ Revised for earlier years as follows: 1949, 120.9; 1950, 106.9; 1951, 115.5; 1955, 95.1; 1957, 92.9; 1958, 90.2 and 1959, 92.1 pounds.
b/ Revised for earlier years as follows: 1949, 42.2; and 1955, 48.9 pounds.
c/ Revised for earlier years as follows: 1949, 163.1; 1951, 150.3; 1952, 158.1 1957, 143.7; 1958, 140.2 and 1959, 140.5 pounds.
d/ Revised for earlier years as follows: 1950, 182.0; 1951, 191.0; 1957, 173.0; 1958, 171.5; and 1959, 169.4 pounds.
e/ Revised in 1957, 807 pounds.
f/ Revised in 1957, 1,461 pounds.

Table 2.--Production of specified commodities, selected averages and projected 1985 with percentage change 1985/1959-61 1/

Commodity	Million units	Averages		Projected 1985	Percentage change: 1969-71 to 1985
		1949-51	1969-71		
					Percent
Cattle and calves 2/	Lb.	10,478	22,185	32,250	+45
Hogs 2/	do.	10,827	13,728	16,900	+23
Chicken 3/ 4/	do.	3,199	8,478	13,020	+54
Turkey 4/	do.	629	1,727	2,620	+51
Eggs	Doz.	5,291	5,863	6,870	+17
Milk 5/	Cwt.	1,165	1,174	1,210	+3
Total Livestock Production	Index 1967=100	75	105	134	+28
Wheat	Bu.	1,035	1,490	1,800	+20
Rice, rough	Cwt.	42.0	86.3	116	+34
Feed grains	Ton	109.9	181.7	261	+44
Soybeans	Bu.	272	1,143	2,150	+88
Peanuts 6/	Lb.	1,853	2,829	4,700	+66
Cotton lint	Bale	13.6	10.1	12	+19
Fruit 7/					
Citrus	Ton	n.a.	10.6	14.3	+35
Noncitrus	do.	n.a.	9.0	10.4	+16
Vegetables and melons 7/	do.	17.9	23.6	29	+23
Potatoes 7/	Cwt.	231.9	319.2	368	+15
Sugar, cane and beet	Ton	2.2	5.7	7.5	+31
Tobacco	Lb.	2,110	1,811	2,065	+14
Total Crop Production	Index 1967=100	77	105	143	+36
Farm Output	Index 1967=100	74	105	139	+32

1/ Livestock items are on a calendar year basis; crops are on a crop year basis. 2/ Carcass weight. 3/ Farm chickens and commercial broilers. 4/ Ready-to-cook basis. 5/ Milk equivalent, fat solids basis. 6/ Farmer's stock basis. 7/ Fresh equivalent. n.a. Not available.

In 1971, per capita meat consumption in Japan was 27 pounds, and in the EEC, 122 pounds. The average for the rest of Europe was somewhat less than in the EEC. Thus, if our own experience is any guide, there is tremendous room for increased sales of meat, and/or feedstuffs.

We complain about the rate food prices are advancing, but they are going up even faster in Europe. A few weeks ago U.S. News printed this comparison of rates of change.

(Show page clipped from U.S. News)

Since the fall of 1971, there has been a total of three devaluations of the U.S. dollar with respect to EEC currencies. This has made our products cheaper, but, for about half of our exported products, no more competitive. The reason is that the EEC protects its agricultural producers with a sliding tariff which guarantees that certain of our products are available only at prices higher than some previously determined domestic support level.

This combination of events--rapidly rising food prices despite the potentially available lower cost supplies from abroad--is creating considerable dissatisfaction in Europe as well as in the U.S.

There is, after all, another way to protect farmers besides high tariff walls, namely, direct payments. This is being carefully explored now in Europe as an alternative to the cumbersome sliding import levy and the accompanying high consumer food prices. Abandonment of these high tariffs could open up a huge new market for U.S. products. This additional competition for our domestic supplies would do nothing to hold down our own food prices.

While there may be a "shortage" of protein in the form in which we like to consume it (as indicated by sharply higher prices of meat animals), there is no shortage of protein, as such. In fact, all of the protein we obtain from meat animals could be produced from soybeans alone on fewer acres of soybeans than we now grow. The protein thus produced would have to be fortified with methionine - an amino acid in which soy protein is deficient.

Last year we harvested 1,276,000,000 bushels on 45.8 million acres. Each bushel weighs 60 pounds, and mature beans have a protein content of 34 percent. Thus, 26 billion pounds of soy protein were produced, or 124.5 pounds per capita.

Recall that total protein consumption from all sources was 100 grams per person per day or 80.5 pounds per year. Of course, we export a large proportion of the soybeans we produce - 37 percent for 1972. Even so, the portion remaining for domestic use would still theoretically provide over 78 pounds per person.

Clipping from U.S. News
April 2, 1973

INTERNATIONAL COMPARISON OF FOOD

Consumer Price Changes for Food: December, 1971, to December, 1972

	Change
Canada	7.7%
United States	4.8%
Japan	4.9%
France	8.7%
Germany	8.0%
Italy*	8.4%
United Kingdom*	7.9%

*November, 1971, to November, 1972.

Source: Organization for Economic Co-operation and Development Economic Indicators; February, 1973.

All this is by way of saying that livestock products are relatively expensive sources of protein. The next table illustrates this very clearly.

(Show Table 4. from Plant Proteins
An Assessment of Their Future)

Maintenance of a large cow herd, the need to keep the critters warm at feed prices for fuel, low reproductive rates and high feed conversion ratios all operate to hold up the price of beef. The greater efficiency with which poultry convert feed into meat is evident from the data presented in the table.

This comparison of relative costs brings up one of my favorite topics of speculation: If soy protein is so cheap, and meat so expensive, how come the companies that are long in textured vegetable protein technology haven't seized this opportunity to introduce their products and capture a good sized chunk of the market for meat? As it is, the bulk of the TVP is sold to institutions to be used as extenders for ground beef: FNS recommends 70% ground beef, 30% TVP. In this form, TVP costs 11 cents per pound, hydrated basis, and has about the same protein content as regular hamburger viz., 20 percent.

Recently some stores have made tentative moves in the direction of mixing Bontrae TVP with hamburger and selling the product at a sharp discount from regular hamburger prices, but this is piddling considering the apparent scope of the opportunity for market penetration.

My own explanation of this phenomenon is that virtually all of the large companies involved in the manufacture of TVP find themselves in a conflict of interest situation. Listen to these names: Archer Daniels Midland, Cargill, Central Soya, General Mills, Ralston Purina, and Staley. All these firms are also long in prepared livestock feeds. Swift, another producer of TVP is, of course, up to its ears in meat processing. Worthington Foods, the only company that has made a major effort to sell TVP in the form of meat analogs to consumers has virtually to itself a low volume, high profit market, and it probably wants to keep things that way. One can easily visualize the accountants at the former companies running the consequences of a substantial TVP penetration of the meat market through their balance sheets and deciding that maybe they'd be better off sticking to their livestock feeds. With feed concentrates to meat-on-the-hoof conversion rates of 4.6 to 1 for hogs and 6.8 to 1 for cattle on feed, one can imagine that sales of soy-based meat analogs would have to be very profitable to offset the reduced volume of product sold, even though only about 15 percent of the feed concentrates fed come from manufacturers of formula feeds.

TABLE 4: Relative Costs of Utilizable Protein as Derived From Selected Food Source

Food Source	Col. 1 Price of Source Material 1/	Col. 2 Crude Protein Content 2/	Col. 3 NPU Value	Col. 4 Utilizable Protein Content (Col 2 X Col 3)	Col. 5 Cost of Utilizable Protein (Col 1 ÷ Col 4)
	(per lb)	(percent)	(Percent)	(Percent)	($ per lb.)
s and products					
rk, boneless carcass 6/7/	43.0	15.7	84.0	13.2	3.25
ef, boneless carcass 4/7/	48.7	19.5	76.7	15.0	3.26
icken, mature 4/ 6/	32.7	19.0	69.6	13.2	2.46
ankfurters 7/	64.0	14.2	64.0	9.1	7.04
latin 4/6/8/	70.0	85.6	2.5	2.1	32.71
sh 3/4/	44.6	18.3	79.5	14.5	3.07
sh Protein Concentrate 4/7/	40.0	80.0	71.7	57.4	.70
y products					
lk, whole, fluid 3/6/	6.7	3.5	81.6	2.9	2.34
lk, skim, powder 3/6/	22.4	35.6	79.6	28.3	.79
eddar cheese 4/6/	51.9	25.0	69.8	17.4	2.97
ey, dried 4/	9.0	12.7	83.9	10.7	.84
ey protein concentrate 4/	75.0	84.0	84.0	70.6	1.06
sein 3/6/	60.0	99.0	72.1	71.4	.84
gs, medium size	25.0	12.8	93.5	12.0	2.09
mes and Oilseeds					
ans, average 4/6/7/	6.7	21.4	38.4	8.2	.81
as, dried 4/6/	5.5	24.0	46.7	11.2	.49
anuts, shelled 3/6/8/	18.2	26.9	42.7	11.5	1.58
ybean flour, low fat 6/7/	8.5	44.7	61.4	27.4	.31
ybeans, extruded 6/7/	28.0	52.5	58.0	30.4	.92
same seed 3/5/	23.6 9/	33.4	53.4	17.8	1.32
nflower seed 5/ 6/	17.5 9/	23.0	58.1	13.4	1.31
ttonseed meal or deglanded flour 3/6/	13.0 10/	42.3	52.7	22.3	.58
ns					
rn meal, whole 4/5/	6.4 9/	9.2	51.1	4.7	1.36
our, white, wheat 5/6/8/	6.5	11.8 12/	45.6	5.4	1.21
our, white, wheat with % L-Lysine HCL 6/8/11/	7.2	11.8 12/	59.0	7.0	1.03
eat gluten 5/8/	22.1 9/	80.0	37.0	29.6	.75
ce, whole 5/6/8/	9.0	7.5	70.2	5.3	.71
eat, whole grain 3/5/	3.3	12.2	65.2	8.0	.41

Farm value, or the equivalent price at a manufacturer, in wholesale lots.

Amino Acid Content of Foods, M.S Orr and B.K. Watt. Home Economic Research Report No. 4, U. S. Department of Agriculture, Washington, D. C., 1968.

Amino Acid Content of Food and Biological Data on Proteins - FAO Nutritional Studies Report No. 24.

Isoleucine is the limiting amino acid egg pattern.

TABLE 4 (Cont'd)

4/ Tryptophan is the limiting amino acid egg pattern.
5/ Lysine is the limiting amino acid egg pattern.
6/ Methionine is the limiting amino acid egg pattern.
7/ Valine is the limiting amino acid egg pattern.
8/ Threonine is the limiting amino acid egg pattern.
9/ 64% of Wholesale price (in 100# lots) from El Molino Mills Source List.
0/ Expected price for deglanded cotton seed flour in car load lots.
1/ Lysine added is calculated at .7 cents per pound which is derived from using lysine at $2.00 per pound. At .3% this is .6 cents per pound, plus .1 cents per pound for labor.
2/ NPU values used here were calculated from the PER values by the following equation: NPU = 36.45 + 14.1$\frac{1}{2}$ PER. NPU is the net protein utilization which is the proportion of nitrogen intake that is retained in the human body. Since NPU values vary with the research technique used, there is a range of values for the same product.

If this analysis is correct, we may anticipate that the initial splash will be made by some outfit like Lipton, General Foods, or McCormicks which have good access to the chainstores, but no particular interest in the fortunes of the livestock industry. What marketing impediments will be placed in the way of these products is hard to say. Perhaps we will have another margarine situation on our hands.

One would think, though, that a cost difference of the magnitude shown on the table would eventually be exploited by someone, and I am surprised at the indifference of the Department's own analysts toward this issue.

Before summarizing I'd like to mention one other development on the horizon which may eventually have a profound influence on the protein situation. Some few years ago a geneticist at Purdue discovered a high protein corn - one that when fed directly or mixed with other feed ingredients, greatly reduced the need for oilseed meal protein supplements. At the moment, yields of this type of corn are not quite competitive with the conventional hybrids, and the market provides no way for producers to be rewarded for the higher protein content of the opaque-2 corn, but there are people working on this problem. Their target is a grain with the soy meal supplement built in. It doesn't take much imagination to see what this would do to the protein supply.

I believe we have witnessed a confluence of events which is unlikely to occur again: rapid rates of inflation of currencies here and abroad, failure of the anchovie catch in Peru, sharp declines in crop production in several important countries, successive devaluations of the dollar, a Presidential election, and a desperate desire to get out from under a long war where the enemy held all but a couple of the high cards. We can sympathize with the eagerness of the agricultural leadership to clean out our surplus storage bins, even if, with hindsight, we can't unqualifiedly admire the result. In this connection, I think it is significant that no Cassandras were heard from last May, save, perhaps, the editorial writer in Barron's who pointed to the adverse consequences of the wheat deal on our baking industry. I think this illustrates as well as anything could that the economic system is open and not closed. While econometricians play with models which are essentially closed, the agricultural economy is, in fact, buffeted by a host of occurrences which are beyond anyone's power to anticipate.

There is no shortage of protein, as such. There is a temporary shortage of protein in the form of meat animals, one which could have an adverse long-run impact on livestock enterprises as consumers begin to search for alternatives. I don't know where we are on our geometric progression toward the limit to growth, but from the information at hand I think it would be dangerous to assume that the results of the events I mentioned

earlier will proceed forever. Given an even break on the weather - worldwide - over the next couple of years and assuming farmers use the additional acres authorized by announced changes in our farm programs, I think we can expect lower prices for food grains and feedstuffs. Lower prices for poultry, hogs and cattle will follow in due course.

These adjustments will not be as dramatic as the price increases of recent months. There is a good chance that foreign and domestic demand will hold up pretty well in the next marketing year or two as inventories are restored. I doubt, however, that retail prices will decline to the levels that consumers were used to in 1970 and 1971 - Congress, the Federal Reserve Board and the Bureau of Engraving will see to that.

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POST SCRIPT

The trouble with reports like this is that they usually have a short half-life -- something on the order of three days. One of the embarrassments arising from postponed speeches is the disintegration wrought by time and events. Most of my talk holds up, but not all. For example, it looks now like we're not going to get an even break on the weather - but we've had late seasons before, some of which turned out near record yields. The impact of weather on prices and inventory accumulation this year remains very much up in the air. Peru has nationalized its anchovy industry, which, if precedent is any guide, is a harbinger of continued shortages.

Archer Daniels, holder of several important patents for extruded TVP, intends to test market TVP meat substitute dishes under the Red Skillet brand name.

The Peronists are back in power in Argentina. The last time they held sway they practically ran the beef producing industry into the ground. Their plans for new taxes indicate that they haven't changed. Beef supplies from that source are bound to diminish.

Finally, we have a 60-day price freeze, and feed prices that have gone through the roof, a combination which guarantees a retrenchment in livestock production.